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Sheet trailing edge lifter

Method and apparatus for guiding sheets to a sheet processing machine, in particular a printing press.

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The invention relates to a method and an apparatus for guiding sheets to a sheet processing machine, in particular a printing press.

- 10 In particular during the processing of sheets with a smooth surface, such as coated paper, coated sheets or films, there is the problem that the sheets in the overlapping stream adhere to one another as a result of adhesion forces. This leads to the situation in which,
- 15 when the first aligned sheet is pulled off, the respective second sheet is carried along with it and, when the overlap is pushed together during the alignment of the first sheet, the second sheet is displaced with it, which leads to erroneous sheet
- 20 transport and to a stoppage of the sheet processing machine.

- DE 44 13 089 C2 provides for blown air to be blown continuously under the sheet stream from below, in
- 25 order in this way to reduce the adhesion forces between two sheets following one another. However, the blown air under the sheet stream disturbs the uniform guidance of the sheets.

- 30 The object of the invention is, then, to provide an alternative method and an apparatus with which the adhesion forces between the sheets of a sheet stream can be reduced effectively.

- 35 According to the invention, the object is achieved by the features of claims 1, 4 and 12.

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It is a particular advantage of the invention that the cancellation of the adhesion forces between sheets lying on one another or following one another is initiated by a separation measure which acts on the overlapping stream from above. As a result of this measure, the separation can be carried out in a very deliberate manner in a specific region of the overlapping stream, in which the remaining overlapping stream remains unaffected.

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By forming the lifting apparatus as a blowing/suction nozzle, the sheet trailing edge can even already be lifted when the latter is still moving and not just only once it has struck the front guides. Lateral alignment of the sheet can continue to be carried out without hindrance.

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In one advantageous development, an additional free jet nozzle blows blown air between the lifted sheet trailing edge of the first sheet and the upper side of the following sheet.

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A ledge on the underside of the sheet lifting apparatus is arranged at a short distance behind the blowing/suction nozzle and assists the separation of the sheets if the second sheet is lifted as well by adhesion forces.

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A linear guide arranged in the transport direction permits the adjustment of the apparatus according to the invention to the sheet format to be processed.

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An exemplary embodiment of the invention is illustrated in the drawings and will be described in the following text.

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In the drawings:

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figure 1 shows a sheet processing printing press in section in a schematic illustration,

5 figure 2 shows a feed table of the sheet feeder in a schematic illustration,

figure 3 shows the lifting apparatus according to the invention above the feed plane in a schematic illustration, and

10 figure 4 shows a plan view of the apparatus according to the invention.

15 A machine that processes sheets 7, for example a printing press 1, has a feeder 2, at least one printing unit 3 and/or 4 and a deliverer 6. The sheets 7 are taken from a sheet stack 8 and, separated or overlapped, are fed over a feed table 9 to the printing units 3 and 4, the latter each containing, in a known manner, a plate cylinder 11; 12. The plate cylinders 20 11 and 12 each have an apparatus 13, 14 for fastening flexible printing plates. Furthermore, each plate cylinder 11; 12 is assigned an apparatus 16; 17 for semiautomatic or fully automatic printing plate change.

25 The sheet stack 8 rests on a stack plate 10 which can be raised under control. The removal of the sheets 7 is carried out from the upper side of the sheet stack 8 by means of what is known as a suction head 18 which, 30 inter alia, has a number of lifting and dragging suckers 19, 21 for separating the sheets 7. Furthermore, blowing devices 22 for loosening the upper layers of sheets and sensing elements 23 for stack tracking are provided. In order to align the sheet 35 stack 8, in particular the upper sheets 7 of the sheet stack 8, a number of lateral and rear stops are provided.

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5 The feed table 9 has at least one transport belt 26, preferably a suction belt, to transport the sheets or the sheet stream to front aligning guides, also known as front guides 27. A lateral alignment apparatus 28 is likewise arranged in the front region of the feed table 9. The aligned sheet 7 is gripped by a pregripper 29 and fed to a feed drum 31.

10 A sheet lifting apparatus 32 is arranged above the overlapped sheet stream, approximately at the distance of the format length 1 from the front guides 27. This has substantially at least one blowing/suction nozzle 33, preferably a number of blowing/suction nozzles 33 arranged distributed beside one another over the format width of the sheet stream. The blowing/suction nozzle 15 33 is aligned in such a way that a blown air jet aimed in the sheet transport direction is blown out substantially tangentially over the sheet stream at a short distance a (e.g. a = about 4 millimeters). By 20 using what is known as the "aerodynamic paradox" effect, the sheet trailing edge is lifted and thus separated from the following sheet lying underneath.

25 In order to assist this separating effect, at least one, preferably a number of free jet nozzles 34 arranged beside one another are provided, whose blown air jet is aimed at the sheet trailing edge obliquely from above, so that the blown air jet can enter between the underside of the first sheet and the upper side of 30 the following, lower sheet. All the free jet nozzles 34 are arranged such that they can be adjusted transversely with respect to the sheet transport direction and can be locked at a desired position. A small ledge 36 on the underside of the lifting 35 apparatus 32 is located, as viewed in the sheet transport direction, at a short distance b (e.g. b = about 2 millimeters) in front of the blowing/suction nozzle 33. This measure benefits the separation of two

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successive sheets if the second sheet should be lifted as well, for an example as a result of static electricity, adhesion force.

5 In order to be able to adjust the lifting apparatus 32 to the sheet format length 1 to be processed, a linear guide 37, on which the lifting apparatus 32 is mounted such that it can be displaced, is provided on one side of the feed table 9.

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An air supply duct 38 in the interior of the lifting apparatus 32 supplies the blowing/suction nozzle 33 and the free jet nozzle 34 with blown air from a blown air source, not illustrated. The blown air streams out continuously. In a further development, provision is made to cycle the blown air at the cycle rate of the sheet processing machine. For this purpose, a rotary valve or electromagnetically driven valves is or are used.

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Alternatively, it is proposed to form the nozzle 33 as a suction gripper and to act on it with a vacuum instead of with blown air, while the free jet nozzle 34 continues to be supplied with blown air.

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The sheets 7 are separated from the sheet stack 8 by means of the suction head 18 and fed to the front guides 27 in overlapped form by means of transport belt 26. By means of the sheet lifting apparatus 32 arranged above the sheet stream at the sheet length distance 1 in front of the front guides 27, the sheet trailing edge of the respective first sheet 7 of the sheet stream is lifted and blown under by the free air jet from the free jet nozzle 34.

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The sheet trailing edge is preferably lifted as soon as the sheet leading edge has reached the front guides. As a result of this measure, the first sheet can

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thereupon or simultaneously be aligned laterally
without carrying the second sheet along with it.

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List of designations**RECEIVED
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- 1 Printing press
- 2 Feeder
- 3 Printing unit
- 4 Printing unit
- 5
- 6 Deliverer
- 7 Sheet
- 7a Next sheet
- 8 Sheet stack
- 9 Feed table
- 10 Stack plate
- 11 Plate cylinder
- 12 Plate cylinder
- 13 Printing plate fastening device
- 14 Printing plate fastening device
- 15
- 16 Printing plate changer
- 17 Printing plate changer
- 18 Suction head
- 19 Lifting sucker
- 20
- 21 Dragging sucker
- 22 Blowing device
- 23 Sensing element
- 24 Stop
- 25
- 26 Transport belt
- 27 Front guide
- 28 Lateral alignment apparatus
- 29 Pregripper
- 30
- 31 Feed drum
- 32 Sheet lifting apparatus
- 33 Blowing/suction nozzle
- 34 Free jet nozzle
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36 Ledge (32)
37 Linear guide
a Distance (32 - 9)
b Distance (36 - 33)
l Sheet format length